

FUJIWARA- U.S. Pat. Appln. No. 10/763,419

Attorney Docket No.: 008312-0307911

- AMENDMENT -

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. - 20. (*Cancelled*).

21. (*New*) A heat dissipating device which dissipates heat from a heat generating object, comprising:

a heat receiving unit having a heat receiving surface and a heat dissipating surface on an opposite side of the heat receiving surface, the heat receiving surface being thermally coupled to the heat generating object;

a heat transferring unit, mounted on the heat dissipating surface of the heat receiving unit, which transfers the heat received by the heat receiving surface and diffuses the transferred heat over the heat dissipating surface;

a heat dissipating unit, mounted on the heat dissipating surface of the heat receiving unit, which dissipates the diffused heat; and

a heat conductive cover, arranged between the heat transferring unit and the heat dissipating unit, that covers the heat transferring unit,

wherein the heat transferring unit includes a plurality of heat pipes each of which has a long shape and extends in the same direction as to each other along the heat dissipating surface of the heat receiving unit,

wherein the heat conductive cover is configured as a plate, and includes a portion, which contacts the heat dissipating surface of the heat receiving unit, and a plurality of projecting portions, each of which projects from the heat dissipating surface, receives each of the heat pipes of the heat transferring unit, and has an inner surface being thermally connected to the outer surface of each heat pipe received therein, and

wherein the heat dissipating unit includes a plurality of heat dissipating plates which are formed independently to each other and arranged in the extending direction

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of each heat pipe to separate from each other, each heat dissipating plate extending in a direction which crosses the extending direction of each heat pipe and having a plurality of recesses which fit on the projecting portions of the heat conductive cover and are thermally connected thereto.

22. (New) The heat dissipating device of claim 21, wherein a cross section of each heat pipe of the heat transferring unit along a direction crossing the extending direction thereof is flattened,

a cross section of each projecting portion of the heat conductive cover along the direction crossing the extending direction of each heat pipe is flattened,

one of a pair of flat regions in the outer surface of the flattened cross section of each heat pipe is thermally connected to the heat dissipating surface of the heat receiving unit, and

another of the pair of flat regions in the outer surface of the flattened cross section of each heat pipe is thermally connected to a flattened portion of the inner surface of each projecting portion of the heat conductive cover, the flattened portion of the inner surface facing the heat dissipating surface of the heat receiving unit.

23. (New) A heat dissipating device which dissipates heat from a heat generating object, comprising:

a heat receiving unit having a heat receiving surface and a heat dissipating surface on an opposite side of the heat receiving surface, the heat receiving surface being thermally coupled to the heat generating object;

a heat transferring unit mounted on the heat receiving surface of the heat receiving unit excluding a portion of the heat receiving surface that is thermally connected to the heat generating object, the heat transferring unit configured to transfer the heat received in the heat receiving surface and to diffuse the transferred heat in the heat receiving unit; and

a heat dissipating unit, mounted on the heat dissipating surface of the heat receiving unit, that dissipates the diffused heat,

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wherein the heat transferring unit includes a plurality of heat pipes each of which has a long shape and extends in the same direction as to each other along the heat receiving surface of the heat receiving unit that excludes a portion of the heat receiving surface thermally connected to the heat generating object, and

wherein the heat dissipating unit includes a plurality of heat dissipating plates which are formed independently to each other and arranged in the extending direction of each heat pipe to separate from each other, each heat dissipating plate extending in a direction which crosses the extending direction of each heat pipe.

24. (New) The heat dissipating device of claim 23, wherein a cross section of each heat pipe of the heat transferring unit along a direction crossing the extending direction thereof is flattened, and

one of a pair of flat regions in the outer surface of the flattened cross section of each heat pipe is thermally connected to the heat receiving surface of the heat receiving unit that excludes a portion of the heat receiving surface thermally connected to the heat generating object.

25. (New) An electronic apparatus, comprising:

a circuit board including an electronic part generating heat;

a main body installing the circuit board; and

a heat dissipating device which is installed in the main body and dissipates heat from the electronic part, the heat dissipating device comprising:

(a) a heat receiving unit having a heat receiving surface and a heat dissipating surface in an opposite side of the heat receiving surface, the heat receiving surface being thermally connected to the electronic part;

(b) a heat transferring unit mounted on the heat dissipating surface of the heat receiving unit, transferring the heat received in the heat receiving surface, and diffusing the transferred heat over the heat dissipating surface;

(c) a heat dissipating unit mounted on the heat dissipating surface of the heat receiving unit, and dissipating the diffused heat; and

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(d) a heat conductive cover which is arranged between the heat transferring unit and the heat dissipating unit, and covers the heat transferring unit,

wherein the heat transferring unit includes a plurality of heat pipes each of which has a long shape and extends in the same direction as to each other along the heat dissipating surface of the heat receiving unit,

wherein the heat conductive cover is configured by a plate, and includes a portion, which contacts the heat dissipating surface of the heat receiving unit, and a plurality of projecting portions, each of which projects from the heat dissipating surface, receives each of the heat pipes of the heat transferring unit, and has an inner surface being thermally connected to the outer surface of each heat pipe received therein, and

wherein the heat dissipating unit includes a plurality of heat dissipating plates which are formed independently to each other and arranged in the extending direction of each heat pipe to separate from each other, each heat dissipating plate extending in a direction which crosses the extending direction of each heat pipe and having a plurality of recesses which fit on the projecting portions of the heat conductive cover and are thermally connected thereto.

26. (New) The electronic apparatus of claim 25, wherein a cross section of each heat pipe of the heat transferring unit along a direction crossing the extending direction thereof is flattened,

a cross section of each projecting portion of the heat conductive cover along the direction crossing the extending direction of each heat pipe is flattened,

one of a pair of flat regions in the outer surface of the flattened cross section of each heat pipe is thermally connected to the heat dissipating surface of the heat receiving unit, and

another of the pair of flat regions in the outer surface of the flattened cross section of each heat pipe is thermally connected to a flattened portion of the inner surface of each projecting portion of the heat conductive cover, the flattened portion of the inner surface facing the heat dissipating surface of the heat receiving unit.

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27. (New) An electronic apparatus, comprising:
a circuit board including an electronic part generating heat;
a main body installing the circuit board; and
a heat dissipating device which is installed in the main body and dissipates heat from the electronic part, the heat dissipating device comprising:

(a) a heat receiving unit having a heat receiving surface and a heat dissipating surface in an opposite side of the heat receiving surface, the heat receiving surface being thermally connected to the electronic part;

(b) a heat transferring unit mounted on the heat receiving surface of the heat receiving unit with excluding a part of the heat receiving surface thermally connected to the electronic part, transferring the heat received in the heat receiving surface, and diffusing the transferred heat in the heat receiving unit; and

(c) a heat dissipating unit mounted on the heat dissipating surface of the heat receiving unit, and dissipating the diffused heat,

wherein the heat transferring unit includes a plurality of heat pipes each of which has a long shape and extends in the same direction as to each other along the heat receiving surface of the heat receiving unit with excluding a part of the heat receiving surface thermally connected to the electronic part, and

wherein the heat dissipating unit includes a plurality of heat dissipating plates which are formed independently to each other and arranged in the extending direction of each heat pipe to separate from each other, each heat dissipating plate extending in a direction which crosses the extending direction of each heat pipe.

28. (New) The electronic apparatus of claim 27, wherein a cross section of each heat pipe of the heat transferring unit along a direction crossing the extending direction thereof is flattened, and

one of a pair of flat regions in the outer surface of the flattened cross section of each heat pipe is thermally connected to the heat receiving surface of the heat receiving

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unit with excluding a part of the heat receiving surface thermally connected to the electronic part.